



STATE OF MICHIGAN
TERRI LYNN LAND, SECRETARY OF STATE
DEPARTMENT OF STATE
LANSING

CONTENTS OF THIS PACKET

This packet contains the following information regarding mechanic testing, certification, and trainee permit:

- [Information for the Mechanic Trainee](#)
- [Selected Secretary of State Branch Offices](#)
- [Mechanic Certification Frequently Asked Questions](#)
- [Mechanic Study Guides](#)

Read the information in this packet carefully. Then, if you have further questions about the materials, contact the Business Licensing Division, Mechanic Certification Section, Lansing, Michigan 48918, or telephone (517) 373-9060.

INFORMATION FOR THE MECHANIC TRAINEE

There are two ways a person can get the skills needed to be a mechanic. The first is by going to a school which offers automotive training. This usually includes hands-on learning along with classroom studies. The other way is by working at a repair shop with an experienced mechanic who can teach proper repair methods and see that the work done by the trainee is correct.

Most good mechanics have learned their trade by both schooling and experience on the job. Today's cars and trucks are becoming more and more complicated to repair. This means that both training and experience are more important than ever to the person who wants to earn a living as a mechanic.

If you are currently performing major repairs on motor vehicles in Michigan, you must be a certified mechanic or hold a valid trainee permit.

A mechanic trainee permit is valid for a period of two years from the date of issue in the major repair categories listed on the permit. A permit may not be renewed. Upon expiration of the trainee permit, a mechanic trainee must either become certified or stop performing repairs in the categories listed on the permit.

A mechanic trainee may perform repairs only in the categories listed on the permit under the supervision of a mechanic who is currently certified by the State of Michigan in those repair categories.

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A mechanic trainee should display his or her trainee permit in a conspicuous location, and when a mechanic trainee works on a motor vehicle, his or her name and trainee permit number must appear on the customer's final invoice. The name and certification number of the supervising mechanic must also appear on the final invoice. It is the responsibility of trainees and certified mechanics to insure that their names and numbers are not used inappropriately by their employers.

The Bureau of Regulatory Services may take action to suspend or revoke a mechanic trainee permit if a trainee misrepresents the need for repairs, performs unnecessary repairs, or makes false or misleading statements in connection with a diagnosis or repair. In addition, a mechanic trainee may be required to obtain additional training or discontinue performing certain repairs if it is determined that the mechanic or trainee disregarded or departed from accepted industry repair standards.



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MECHANIC TESTING OFFERED AT SELECTED SECRETARY OF STATE BRANCH OFFICES

The Bureau of Regulatory Services offers written tests at selected Secretary of State branch offices around the state. On the back of this notice is a list of these test locations. Please save the list for future reference.

PLEASE NOTE:

- Tests are written, multiple-choice format.
- Test are closed-book format. No reference materials are allowed during testing.
- Absolutely no copying of examination items is permitted.
- Electronic devices may NOT be brought to the examination room.
- Select branch offices administer written tests only and do not have specific information concerning your test results. If you have questions about mechanic test results, mechanic certification issues, or need special testing (oral or interpreter), please contact:

Michigan Department of State
Bureau of Regulatory Services
Business Licensing Division
Licensing Section
Lansing, MI 48918-1210
Telephone: (517) 636-6400

- If you reach a disconnected telephone number, contact another Secretary of State branch office for updated information on testing, or contact the Licensing Section at the address or telephone number above.
- Reminder: All motor vehicle mechanics performing major repairs for compensation must be certified by the Michigan Department of State in the categories in which they perform repairs. A person who is not certified must obtain a trainee permit by contacting the Licensing Section.

IMMEDIATE NEED TESTING

If you have an offer of employment that you will lose if you do not become certified quickly, contact the Licensing Section to find out if you qualify for immediate need testing.

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SECRETARY OF STATE MECHANIC TEST LOCATIONS

<u>Branch Office (City)</u>	<u>Telephone Number</u>	<u>Branch Office (City)</u>	<u>Telephone Number</u>
Adrian.....	(517) 265-8981	L'Anse	(906) 524-6915
Allegan	(616) 363-8778	Lansing Downtown.....	(517) 334-8305
Alpena	(989) 356-9742	Lansing Delta Township.....	(517) 334-8305
Ann Arbor	(734) 665-0627	Lapeer	(810) 664-4064
Bad Axe.....	(989) 269-7186	Livonia 7 Mile	(248) 476-4538
Battle Creek	(269) 962-4045	Ludington	(231) 843-4353
Bay City.....	(989) 667-0558	Manistee	(231) 723-6471
Benton Harbor.....	(269) 925-1328	Manistique.....	(906) 341-2231
Bessemer	(906) 667-0271	Marine City	(810) 765-9100
Beulah	(231) 882-4831	Marquette	(906) 226-7556
Big Rapids.....	(231) 796-8510	Menominee	(906) 863-4423
Cadillac	(231) 775-3231	Mt. Morris	(810) 732-6040
Cheboygan.....	(231) 627-3159	Mt. Pleasant	(989) 772-0132
Clinton Township	(586) 791-1250	Muskegon	(231) 773-8900
Coldwater	(517) 278-2467	Newberry.....	(906) 293-3340
Detroit Vernor.....	(313) 541-5454	Owosso	(810) 732-6040
Dowagiac	(269) 782-6512	Petoskey	(231) 347-9681
East Tawas	(989) 362-6135	Port Huron.....	(810) 984-4164
Escanaba	(906) 786-5830	Portage	(269) 337-3800
Flint South	(810) 732-6040	Saginaw South.....	(989) 777-4780
Gaylord.....	(989) 732-1413	St. Ignace	(906) 643-9230
Grand Rapids Southeast.....	(616) 363-8778	Sandusky	(810) 648-4553
Hart	(231) 873-5423	Sault Ste. Marie	(906) 632-6780
Hastings	(269) 945-3144	Shelby Lakeside.....	(586) 532-1407
Highland Park	(313) 541-5454	Southfield	(248) 476-4538
Hillsdale.....	(517) 437-2476	Stanton.....	(989) 831-4106
Holland	(616) 363-8778	Taylor	(313) 292-5810
Houghton.....	(906) 482-7270	Three Rivers	(269) 273-5855
Howell	(517) 546-9826	Traverse City.....	(231) 922-5220
Iron Mountain	(906) 774-5202	Warren Dequindre.....	(586) 775-8990
Iron River.....	(906) 265-4811	Waterford	(248) 674-0485
Jackson Downtown	(517) 788-9535	West Branch	(989) 345-1199
Kalamazoo Downtown	(269) 337-3811	Wyoming	(616) 363-8778
Kalkaska.....	(231) 258-9166	Ypsilanti	(734) 528-0923

MECHANIC CERTIFICATION

FREQUENTLY ASKED QUESTIONS

MECHANIC CERTIFICATION REQUIREMENTS

1. **Q.** Who must be certified?
 - A.** All persons who repair motor vehicles for compensation, including the reconditioning, replacement, diagnosis, adjustment or alteration of the operating condition of the vehicle or any component or sub-assembly, in any category of major repair, must be certified by the State of Michigan. Any person performing major repairs who is not certified must obtain a mechanic trainee permit in the categories of repair in which he or she works.
2. **Q.** What are the motor vehicle repair categories which require state certification?
 - A.** The Automobile and Light Truck repair categories for vehicles under 10,000 pounds G.V.W. are:

1. Engine Repair	7. Electrical Systems
2. Engine Tune-up/Performance	8. Heating & Air Conditioning
3. Front End, Suspension & Steering Systems	9. Collision-Related Mechanical Repair
4. Brakes & Braking Systems	10. Unitized Body Structural Repair
5. Automatic Transmission	11. Pre-1973 Vehicles
6. Manual Transmission, Front & Rear Drive Axles	

The Heavy-Duty Truck repair categories for vehicles over 10,000 pounds G.V.W. are:

1. Engine Repair - Gasoline	5. Suspension & Steering Systems
2. Engine Repair - Diesel	6. Electrical Systems
3. Drive Train	7. Collision-Related Mechanical Repair
4. Brakes & Braking Systems	

Repair categories for other on-road vehicles are:

1. Motorcycle	2. Recreational Trailer
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3. **Q.** How do I become a certified mechanic?
 - A.** You first must pass a test for each repair category in which you want certification. You are not eligible to apply for certification until you have passed the appropriate repair category test. The application for certification is included with your test result letter. You must complete the application and return it with the appropriate fee to the Business Licensing Division, Licensing Section. The address is on the back of this sheet.
4. **Q.** What is the difference between a master mechanic and a specialty mechanic?
 - A.** A mechanic certified in all of the first 8 categories of automobile and light truck repair is a **master automobile mechanic**. Similarly, a mechanic certified in all of the first 6 categories of heavy-duty truck repair is a **master heavy-duty truck mechanic**. A mechanic certified in less than the first 8 automobile and light truck or the first 6 heavy-duty truck repair categories is a **specialty mechanic**.
5. **Q.** When and where can I take the tests?
 - A.** The State of Michigan motor vehicle mechanic tests are available at selected Secretary of State branch offices throughout the state. To find out the offices which administer the tests, telephone your local Secretary of State branch office or the Licensing Section at (517) 636-6400. There is a \$6.00 fee for each test.
6. **Q.** I have worked as a motor vehicle mechanic for many years. Do I have to take tests?
 - A.** Yes, you must pass a test for each repair category in which you want to be certified. The law does not provide a "grandfather clause." The only way to qualify for state certification is to pass the tests. However, if you have passed tests administered by the National Institute for Automotive Service Excellence (ASE), you may be eligible to apply for state certification in certain categories. Telephone the Licensing Section at (517) 636-6400 for further information.
7. **Q.** I took the state test but lost, or did not receive, my test results. How do I find out if I passed?
 - A.** If you have not received your test results after six weeks, or have lost them, you can get assistance by contacting the Licensing Section at (517) 636-6400. **SECRETARY OF STATE BRANCH OFFICE PERSONNEL CANNOT HELP YOU.** They do not have specific information concerning your test results.

8. **Q.** I took the state tests and did not pass. Can I take the tests again and will I have to pay the test fees again?
- A.** Yes, you may retake tests you did not pass. You must pay the \$6.00 test fee for each test you retake. You are, however, encouraged to do additional studying or get more training before taking the tests again.
9. **Q.** Can a person who has a disability or difficulty with the English language take the mechanic tests?
- A.** Yes, persons who would have difficulty taking a written test because of special needs should telephone the Licensing Section at (517) 636-6400.

CERTIFICATION FEES

10. **Q.** What does it cost to become certified?
- A.** To become certified you must complete an application for certification (which is sent with your test result letter) and return the application with the \$25.00 fee to the Licensing Section. You may make application for certification in any number of repair categories at one time and pay a single application fee of \$25.00. If you pass additional tests after you become certified and your certification is current, an amended certificate with the new categories added will automatically be mailed to you at no additional cost.
11. **Q.** Must I renew my certification?
- A.** Yes, there is an annual (yearly) renewal fee of \$20.00. You are responsible for notifying the Licensing Section of any address change. A renewal form will be mailed to you approximately 45 days prior to your certification expiration date. Certification renewals received after the expiration date require payment of a \$10.00 late fee. If your certificate has been expired over one year, telephone (517) 636-6400 for the proper form.

MECHANIC TRAINEE PERMITS

12. **Q.** What is a mechanic trainee permit?
- A.** A mechanic trainee permit makes it possible for a non-certified mechanic to work at a repair facility. A mechanic trainee employed by a repair facility must work under the direct supervision of a certified specialty or master mechanic.
13. **Q.** What are the repair categories for a mechanic trainee?
- A.** The mechanic trainee categories are the same as those for certification. A person may obtain a trainee permit in any number of categories of repair, but cannot remain a mechanic trainee in any single repair category for more than two years.
14. **Q.** How do I apply for a mechanic trainee permit?
- A.** You must complete an Application for Motor Vehicle Mechanic Trainee Permit. For an application, contact the Licensing Section at (517) 636-6400. The completed application must be returned with the \$20.00 application fee. **No fee is required if you are a state-certified mechanic with an unexpired certificate.**

If you have additional questions about the Michigan mechanic certification program or requirements, contact:

Michigan Department of State
Bureau of Regulatory Services
Business Licensing Division
Licensing Section
Lansing, MI 48918-1210
Telephone: (517) 636-6400
Fax: (517) 335-2810

MECHANIC STUDY GUIDES

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MECHANIC STUDY GUIDE
Engine Repair
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items. **NOTE:** There could be up to 5 additional pre-test questions. These questions will not count but may be used on a later version of the test. Your answers to these pre-test questions will not affect your score. Since you won't know which they are, you should answer all questions.

Engine Block Diagnosis & Repair - 12%

Using a bore gauge
Honing a newly bored cylinder
Engine bore diagnosis
Installing pistons in block
Cleaning and assembling

Cylinder Head/Valve Train Diagnosis & Repair - 21%

Intake valve deposits
Valve tappet clearance
Valve timing understanding
Valve tappet adjustment
Valve guide wear
Valve refacing
Valve spring diagnosis
Noisy lifter diagnosis
Valve seats

General Engine Diagnosis - 19%

Oil consumption
.001" cylinder leakage test
Compression test
Sludge in crankcase
Vacuum testing
Low oil pressure
Crankcase blow-by diagnosis
Spark plug diagnosis

Piston Diagnosis & Repair - 10%

Piston design
Ring groove diagnosis
Piston ring diagnosis

Crankshaft & Camshaft Diagnosis & Repair - 15%

Crankshaft end-play
Journal taper diagnosis
Installing cam bearings
Camshaft diagnosis
Crankshaft diagnosis

Miscellaneous - 23%

Understanding measurements to Engine
Assembling procedures
Diagnosing coolant bubbling
Micrometer reading
Bolt head markings
Engine break-in
Water pump diagnosis
Turbocharger diagnosis
Engine R&R procedures
Basic carburetor diagnosis
Vibration/misfire diagnosis
Plastigage use

SAMPLE QUESTION:

A transverse mounted engine with front wheel drive must be removed from the car. All of the following are generally recommended

EXCEPT:

- A. Removing the engine and transaxle as a unit.
- B. Disconnecting the speedometer cable.
- C. Disconnecting the half-shafts.
- D. Removing the differential gears.

ANSWER: D

MECHANIC STUDY GUIDE
Automatic Transmission
Automobile & Light Truck Repair

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Component Diagnosis - 8%

Hydraulic pump
Torque converter
Clutch pack clearance
Pump gear clearance

Internal Operation - 32%

Gear train end-play
Clutch band servo
Planetary gear set
Multiple disc clutch packs
Passing gear operation
Lock-up converters
Vacuum modulator
Valve body shift valves
Shift points
Governor operation
TPS (throttle position sensor)
Operation

General Diagnosis - 18%

Harsh engagement
Governor malfunctions
Fluid diagnosis
Glazed band diagnosis
Fluid leak diagnosis
Pressure testing
Spool valve diagnosis
Burned clutch diagnosis
Fluid loss diagnosis

Driveability Diagnosis - 28%

Downshift problems
Improper shifting
Upshifting problems
Modulator problems
Shift linkage adjustment
No drive diagnosis
Creeps in neutral
Restricted filter
Noisy transmission
Slipping Transmission
Sluggish operation

Repair Procedures - 6%

Transmission remove & replace
Stator support bushing wear
Cooler line repair
Pump to converter engagement

Miscellaneous - 8%

Valve identification
Fluid types
Transaxle knowledge
Valve body components
Direct drive condition

SAMPLE QUESTION:

It takes a moment for the car to move after the gear selector has been placed in "drive."
Which of the following would cause this problem?

- A. A defective neutral safety switch.
- B. A partially plugged screen.
- C. An inoperative lock-up converter clutch.
- D. None of the above.

ANSWER: B

MECHANIC STUDY GUIDE
Manual Transmission, Front & Rear Drive Axles
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items. **NOTE:** There could be up to 5 additional pre-test questions. These questions will not count but may be used on a later version of the test. Your answers to these pre-test questions will not affect your score. Since you won't know which they are, you should answer all questions.

Component R & R - 6%10%

Cluster gear remove & replace
Extension housing seal remove & replace
Synchronizer replacement

Transmission/Transaxle Diagnosis - 32%

Fluid diagnosis
Hard shifting complaints
Transmission v.s. transaxle comparison
Cluster gear end-play
Transaxle gear recognition from picture
Synchronizer problems & operation
3, 4 & 5 speed diagnosis from picture
(4 questions)
Overdrive operation
Extension housing bushing wear
Noise diagnosis
Defective output shaft

Final Drive - 30%

Ring gear run-out
Noise diagnosis
Differential diagnosis
Differential pinion nose angle
Ring & pinion gear sets
Ring & pinion backlash
Pinion bearing preload
Final drive ratio
Pinion seal remove & replace
Limited slip diagnosis
Differential bearing preload
Lubricant Types

Axle Shaft/C.V. Repair - 10%

CV boot installation
Drive axle noise diagnosis (2 questions)
CV joint operation
Vibration Diagnosis

Clutch Diagnosis & Repair - 10%

Clutch disc operation
Noise diagnosis
Chatter diagnosis
Shifting problem diagnosis

Miscellaneous - 12%

Bearing removal and installation procedures
Drive train noise diagnosis
Gear recognition
Trans interlock function
Understanding how direct drive & gear
reduction is accomplished

SAMPLE QUESTION:

The main reason for making a rear end gear tooth contact pattern is to check:

- A. Carrier end-play.
- B. Carrier bearing preload.
- C. Axle gear clearance.
- D. Pinion depth.

ANSWER: D

MECHANIC STUDY GUIDE
Front End, Suspension & Steering Systems
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items. **NOTE:** There could be up to 5 additional pre-test questions. These questions will not count but may be used on a later version of the test. Your answers to these pre-test questions will not affect your score. Since you won't know which they are, you should answer all questions.

Alignment Diagnosis - 34%

"Toe" adjustment procedures
Caster adjustment procedures for various suspension systems
Camber understanding
Camber adjusting procedures for various suspension systems
Total alignment procedures
Caster understanding
Strut suspension alignments

Tire Wear Diagnosis - 10%

Tire wearing angles
Inside tread wear only
Cupping
Feathered outside edge wear
Wear on both inside & outside of tire

Suspension Diagnosis - 18%

Ball joint diagnosis
Measuring curb height
Torsion bar remove & replace
Ball joint remove & replace procedure
MacPherson suspensions
Automatic leveling systems

Steering Diagnosis - 18%

Rack & pinion diagnosis
Power assist diagnosis
Tie rod end diagnosis
Steering gear adjustment
Steering linkage diagnosis
Power steering system bleeding

Driveability Diagnosis - 16%

Pulling diagnosis
Road crown compensation
Wandering or darting diagnosis
Shimmy & bounce diagnosis
Steering wheel centering

Miscellaneous - 4%

Brake rotor R & R precautions
Wheel bearing adjustment

SAMPLE QUESTION:

A car has excessive lean on turns (body roll).
This could be caused by:

- A. Bad shocks.
- B. Worn sway bar bushings.
- C. Weak springs.
- D. All of the above.

ANSWER: D

MECHANIC STUDY GUIDE
Brakes & Braking Systems
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

System Diagnosis - 20%

Load sensing proportioning valves
Brake pedal pulsation
Grabbing brakes
Brake lock-up
Dragging brakes
Combination valve
Gear lube in drums
Brake booster

Master Cylinder Diagnosis & Repair - 9%

Low fluid level
Rebuilding
Swollen diaphragm
Sinking pedal

ABS Diagnosis & Repair - 20%

Pump/motor operation
Safety precautions
Speed sensors
Wheel speed readings
3 way circuits
4 way circuits
Hose replacement

Drum Brake Diagnosis & Repair - 22%

Drum turning, finish
Single anchor Bendix type
Self adjuster diagnosis
Noise diagnosis
Measuring
Primary and secondary shoes

Disc Brake Diagnosis & Repair - 16%

Rotor thickness variation
Rotor surface finish
Caliper overhaul
Brake noise
Brake adjustment
Measuring, lateral run-out

Repair Procedures - 13%

Brake line bleeding
Brake fluid diagnosis
Replacing wheel bearings/races
Brake adjustments

SAMPLE QUESTION:

A car has a spongy pedal. Which of the following could be the cause?

- A. Air in the system.
- B. An internal master cylinder leak.
- C. Worn brake pads.
- D. Warped brake disc.

ANSWER: A

MECHANIC STUDY GUIDE
Electrical Systems
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items. **NOTE:** There could be up to 5 additional pre-test questions. These questions will not count but may be used on a later version of the test. Your answers to these pre-test questions will not affect your score. Since you won't know which they are, you should answer all questions.

OHMS Law & Electrical Symbol

Recognition - 14%

Ohmmeter symbol
Splice symbol
Resistor symbol
Switch symbol
Solenoid symbol
Circuit breaker symbol
Variable resistor symbol
Lamp symbol
Diode symbol
LED symbol

Test Methods/Meter & Equipment

Usage - 11%

Ohmmeter usage
Voltmeter usage
Ammeter usage

Starting System Diagnosis - 20%

Capacity/load testing
Starter armature testing
Starter current draw
Starter relay diagnosis
Voltage drop tests
Circuit resistance test
Battery test
Starter drive diagnosis

Charging System Diagnosis - 5%

R & R battery properly
Alternator output testing

Miscellaneous Circuit Diagnosis - 32%

Short to ground
Regulator diagnosis
Blower motor circuit diagnosis
Horn circuit diagnosis
Turn signal circuit
Dimmer switch diagnosis
Tail lamp circuit
Dashlight circuit
Windshield washer pump circuit
Cooling fan circuit
Oil pressure light circuit

General - 18%

Measuring current flow
Voltage drop
Parallel circuit diagnosis
Junction block replacement
E.S.D. (Electrostatic Discharge)
S.I.R. (Supplemental Inflatable Restraint)
Precautions

SAMPLE QUESTION:

The maximum allowable voltage drop across the ground circuit of the starter system is:

- A. .2 volt.
- B. .7 volt.
- C. 1/2 volt.
- D. 1 volt.

ANSWER: A

MECHANIC STUDY GUIDE
Heating & Air Conditioning
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items. **NOTE:** There could be up to 5 additional pre-test questions. These questions will not count but may be used on a later version of the test. Your answers to these pre-test questions will not affect your score. Since you won't know which they are, you should answer all questions.

Heating & Engine Cooling System

Diagnosis - 22%

Leak diagnosis
Low coolant in radiator
Thermostat
Coolant mixture
Low heater output
Windshield fogging
Heater core hose routing
Radiator cap
Defrost operation
Overheating

General Knowledge of A/C Components & Their Functions - 16%

Receiver drier
Ambient temperature switch
Orifice expansion tube
Compressor muffler
Condensor
Evaporator
Fixed orifice tube
Halide tester

General Knowledge of A/C Systems - 18%

R-12 v.s. R134-a
Refrigerant (understanding change between liquid & gas)
Operating pressures
Effect of moisture in the system
Effect of outside temperature & humidity on System

A/C Diagnosis - 24%

H2O at air ducts
Finding leaks
Overcharged system
Compressor clutch
Gauge set readings
Lack of cold air
Schematic diagnosis

A/C Repair Procedures - 16%

Precautions when discharging system
Compressor o-ring replacement
Correction of excessively high pressure
Compressor replacement
Hose replacement
Charging the system
Leak detection
Condensor replacement

Refrigerant Recovery, Recycling & Handling - 4%

CFC's (Chlorofluorocarbons) and their affect on the environment
Recycle or replace R-12 and R-134a

SAMPLE QUESTION:

An A/C control system has an apparent vacuum leak. Which of the following is the best way to locate the leak?

- A. Feel around the suspected line or component.
- B. Trace the origin of the hissing sound.
- C. Install known good hoses and components in place of the original components.
- D. Spray water on the suspected areas.

ANSWER: B

MECHANIC STUDY GUIDE
Engine Tuneup/Performance
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Computer Control & Sensor Basics - 24%

ROM (Read Only Memory)
Fault codes
Maintaining stoichiometric balance
Closed loop
Oxygen sensor diagnosis
Knock sensor function
Self diagnosis
Hall sensor pattern reading
Types of meters to use
Scan tool usage
TPS operation

Ignition Systems - 13%

Scope pattern diagnosis
Setting timing
No spark diagnosis
Spark plug voltage requirements

Carburetor & Fuel Injection - 10%

Injector pulse width
Fuel line replacement
E.F.I. principals
"Heavy float" symptoms
Types of injection systems

Performance Basics - 10%

Causes of detonation
Spark plug diagnosis
Dirty air cleaner symptoms
Causes of a lean mixture
Influences on performance

Diagnosis (starting system & misc.) - 18%

Engine timing
Slow cranking diagnosis
Circuit resistance checks
Engine vacuum
Catalytic converter
Cylinder leakage
Compression test

Emission Control Systems - 25%

EGR operation
Evaporative emission control system
Hydrocarbon levels
Oxides of nitrogen
O2 sensor operation
Fuel vapor recovery system
Carbon monoxide levels
Exhaust analyzer readings
Engine timing & effect on emissions
Catalytic converter's purpose

SAMPLE QUESTION:

In automotive computers, this memory contains information that tailors the computer to the vehicle.

- A. Programmable Read Only Memory (PROM).
- B. Controllable Access Memory (CAM).
- C. Random Access Memory (RAM).
- D. None of the above.

ANSWER: A

MECHANIC STUDY GUIDE
Unitized Body Structural Repair
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Steels (Characteristics & Identification) -

12%

UHSS (Ultra High Strength Steel)

HSS (High Strength Steel)

Tensile strength

Identification of various steels

Pulling (Straightening) - 8%

Overpulling

How to minimize tearing

Anchoring

Welding - 20%

MIG

Oxyacetylene

Brazing

Shielding gas

Weld quality

Electrode wire use

Precautions

Types of welds

Types of welders

Repairing Structural Components - 25%

A-pillars & B-pillars

Location of welds

Sectioning

Joints to use

Corrosion protection

Weld-through primers

Glass installation

Measuring/Damage Analysis - 21%

Point to point

Indirect damage

Direct damage

Secondary damage

Primary damage

Datum plane

Asymmetrical dimensions

Vehicle centerline

Centering gauges

Loaded measurement

Unitized Body General Understanding -

14%

Crush zones

Design features which initiate the crush process

Space frame construction

Manufactures' tolerances

One-time fasteners

SAMPLE QUESTION:

Two-part epoxy primers:

- A. Provide corrosion protection close to OEM E-coat.
- B. Have an indefinite pot life.
- C. Should be used on structural parts only if a lacquer primer surfacer is not available.
- D. All of the above.

ANSWER: A

MECHANIC STUDY GUIDE
Collision-Related Mechanical Repair
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Steering Components - 12%

Adjustments
Rack & Pinion
Power Steering

Heating & Cooling - 10%

General Questions

Electrical - 30%

Turn Signals
Horn Circuit
Lights
Starter system

Drive Train - 28%

Bearings
Noise Diagnosis
Transaxle
Transmission Linkage

Brakes - 10%

Brake Lines
Hydraulics
Measuring Techniques

Miscellaneous - 10%

Steering Columns
Fuel Leaks

SAMPLE QUESTION:

The mechanic notices antifreeze under the car after completing collision repairs. What should he or she do next?

- A. Remove the radiator and pressure test.
- B. Warm up the engine thoroughly then recheck.
- C. Visually inspect the vehicle for signs of a leak.
- D. Nothing, it is normal for the cooling system to leak after a collision.

ANSWER: C

MECHANIC STUDY GUIDE
Motorcycle Repair
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Fuel Systems - 10%

Causes of a lean mixture
Carburetor systems; float, power, choke, etc.
Spark plug diagnosis
Causes of a rich mixture
Idle mixture adjustment
Diagnosis of a worn needle and seat
Crankcase flooding diagnosis
Carburetor jets
Understanding the idle circuit on a slide type
Carburetor

Skill in Measuring - 13%

Measuring piston ring grooves
Crankshaft end-play
Using plastigage
Using a dial indicator
Spark plug gap
Shaft run-out
Cylinder bore measurements
Understanding decimal equivalents up to 1/1000"
Piston ring end-gap
Reading a micrometer
Understanding metric system measurements

Repair Skills - 17%

Cylinder head bolt torque procedure
Compression test
Repairing float valve wear
Replacing a steel bearing race in aluminum case
Replacing the master link in a drive chain
Valve adjustment
Finishing cylinder walls at overhaul
Fitting pistons to the cylinder
Cylinder leak down test
Valve guide wear
Oil pump installation
Breaker point alignment
Checking for bent forks

Diagnosis - 17%

Poor running with black smoke under heavy throttle
Transmission shifting problems
Backfire
Spark plug fouling and diagnosis
Undershifting or jumping out of gear problem
Coil diagnosis
Hard starting or no start problems
Low oil pressure
Restricted air intake
Rough running and backfiring problems

Ignition & Electrical - 20%

C.D.I. systems compared to point systems
Flywheel stampings
Splicing electrical connections
Continuity testing
Checking voltage in a system
Diagnosing turn signal circuits
Master cylinder operation
Point burning
What tool is necessary to time a flywheel
Timing advance
Alternator output problems
Diagnosing a condenser
Battery charging rates
Zener diode operation

(continued)

MECHANIC STUDY GUIDE
Motorcycle Repair
Automobile & Light Truck Repair

General - 23%

Sticking hydraulic forks
Deglazing cylinders
Understanding the 4-stroke cycle engine
Clutch operation and diagnosis
Full floating piston pins
Oil pressure relief valve operation
Alternator or generator operation
Brake system operation
Adjusting steering stem bearings
Piston slap
Camshaft operation
What is a hydrometer used for
Front drum brakes
Spark plug “reach”
Oil consumption

SAMPLE QUESTION:

Oil circulation in the engine:

- A. Goes from sump to oil pump to bearings to filter.
- B. Goes from filter to bearings to oil pump.
- C. Goes from bearings to filter to oil pump to sump.
- D. Goes from sump to oil pump to filter to bearings.

ANSWER: D

MECHANIC STUDY GUIDE
Recreational Trailer
Automobile & Light Truck Repair

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Electrical Diagnosis - 36%

Trailer tail lamps
Ground wire problems
Turn signal circuits
Determine voltage drop
Trailer stop lamps
Brake controllers
4-Wire connectors
Current supply for trailer brakes
Electrical symbols
Flasher diagnosis
Color codes
Causes of blown fuses
Current flow/resistance

Brake Diagnosis - 26%

Loss of brakes
Grabby brakes
Dragging brakes
Erratic braking, surging
Pull to one side during braking
Adjusting trailer brakes
Brake shoe recognition

Springs/Hitches - 16%

Leaf springs
Equalizing hitches
Adjustment of hitches
Types of trailer springs
Spring maintenance

General Knowledge - 12%

Surge brakes
Reducing sway
Wheel bearing adjustment
Hydraulic brake lines
Metric measurements
Tire wear diagnosis

Wheels/Hubs - 10%

Wheel bearing diagnosis
Wheel bolt torque pattern

SAMPLE QUESTION:

Current flow resistance is decreased when:

- A. Wire length is increased.
- B. Wire diameter is decreased.
- C. Corroded terminals are replaced.
- D. All of the above.

ANSWER: C

MECHANIC STUDY GUIDE

Engine Repair - Gasoline

Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Engine Mechanical Components - 16%

Cylinder blocks
Pistons
Fuel pumps
Spark plugs
Governors
Cylinder heads

Diagnosis - 30%

Engine Miss
Compression test diagnosis
Rough idle
Engine knocks
Power loss
Blue smoke
Overheating

Basic Procedures - 22%

Grinding valves
Starting a flooded engine
How to measure cam lobe wear
Measuring plug wire resistance
Engine assembly
Understanding bolt markings
Valve Adjustment

Skills In Measuring - 14%

How to check cylinder head flatness
How to check crankshaft end-play
Reading a micrometer
Reading plastigage
Measuring main and rod journals

System Operation - 18%

Understanding how engines operate
Purpose for checking clearances
Understanding carburetor operation
Cooling system operation
Engine timing
Ignition systems

SAMPLE QUESTION:

What are the minimum and maximum measurements of a shaft given as 3.750 plus or minus .010?

- A. 3.650 - 3.850
- B. 3.749 - 3.751
- C. 3.740 - 3.780
- D. 3.740 - 3.760

ANSWER: D

MECHANIC STUDY GUIDE

Engine Repair - Gasoline

Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Engine Components - 24%

Detroit blower rotor clearance adjustment
Piston rings
Piston ring grooves
After cooling - benefits
Bolt grade recognition
Lube oil coolers
Turbo charger operation
Valve bridge function

Diagnosis - 34%

Turbo problem diagnosis
Coolant in crankcase
Smoke problem diagnosis
Engine operating temperature
Low oil pressure
Engine tear-down diagnosis
Blow-by
Crankshaft diagnosis
Engine Miss

Lube & Fuel - 10%

Direct injection
Leaky fuel lines
Restarting and engine that has run out of fuel
Fuel Filters

Skills In Measuring - 12%

Tools for measuring
Plastigage reading
Cylinder taper
Reading a micrometer
Crankshaft End-play

Miscellaneous - 20%

Using a vacuum gauge
fuel shut-off solenoid
Idle speed
Detroit diesel R.P.M. setting
Understanding 2-stroke, 4-stroke engines
Valve seat width
Valve lash adjustment
Overheating

SAMPLE QUESTION:

A diesel engine misses at all speeds and there is a puff of smoke when it misfires. What is the most likely cause of this problem?

- A. Erratic governor action.
- B. Stale fuel.
- C. A miscalibrated pump.
- D. A sticking nozzle.

ANSWER: D

MECHANIC STUDY GUIDE

Drive Train

Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Clutch Diagnosis - 10%

Causes of hard shifting

Free play

Hydraulic clutch fluid

Reason for clutch slipping

Clutch Components - 12%

Clutch brake

Pilot bearing

Linkage adjustment

SAMPLE QUESTION:

Which of the following could cause driveline vibration?

- A. Bad engine mounts.
- B. Crossed plug wires.
- C. Over lubed universal joints.
- D. All of the above

ANSWER: A

Axle & Driveline Diagnosis - 22%

Adjusting driveline angles

Pinion bearing preload

Axle shaft replacement

U-Joint angles

Air shift controls

Two-Speed planetary axle

Axle & Drive line Components - 22%

Ring and pinion backlash

Inter-axle differential lock

Drive shaft removal

Pinion bearing preload adjustment

U-joint replacement

Differential side bearing preload

Transmission Diagnosis - 22%

Causes of hard shifting

Gear slipout

Slow shifting problem in a twin countershaft

Transmission

Transmission Components - 14%

Synchronizers

Seal installation

10-Speed twin countershaft operation

4 & 5-Speed synchronized transmissions

Transmission Interlock

MECHANIC STUDY GUIDE

Brakes & Braking Systems

Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Basic Knowledge - 20%

Inversion valve function
Anti-skid brakes
Hydraulic brake line material
Air brake hand valve
Brake chatter
Vacuum booster operation
Air brake line routing
Engine (Jacobs) brake
Air over hydraulic systems

Repair Skills, Air Brakes - 8%

Finding air leaks
Adjusting cam actuated brakes
Brake linkage lubrication
Air line material

Repair Skills, Hydraulic Brakes - 10%

Wheel cylinder assembly
Power booster
Master cylinder residual valve
Master cylinder operation

Diagnosis, Air Brakes - 34%

"S" cam brakes
Air pressures for fail-safe brakes
Cause of excessive air pressure
Dual diaphragm brake chamber operation
Compressor operation
Tractor protection valves
Air brake systems operation
Inoperative trailer brakes
Straight truck air line and operation
Trailer brakes won't release

Diagnosis, Hydraulic Brakes - 14%

Causes of a pulsating pedal
Brake booster operation
Swollen master cylinder diaphragm
Cause of gear lube inside brake drums
Brake lining wear diagnosis
Grabbing brakes

Basic Repair Procedures - 14%

Spring brake repairs
Pushrod travel
Air reservoirs
Slack adjuster and pushrod angle
Grease-soaked brake linings

SAMPLE QUESTION:

Which of the following should a mechanic do before taking apart a spring-type parking brake?

- A. Fill the air reservoir.
- B. Remove the quick release valve.
- C. Remove the diaphragm clamp.
- D. Cage the spring.

ANSWER: D

MECHANIC STUDY GUIDE
Suspension & Steering Systems
Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

Steering System Diagnosis - 18%

Hard steering complaint
Recovering from a turn
Noise in the power steering unit
Wheel shimmy
Tie rod end wear
Oil foaming in power steering system

Suspension Diagnosis - 14%

Air ride suspension operation
Leaf spring failure
Tire problems
Hendrickson suspensions
Torque rods
Tandem axle alignment

Wheel Alignment - 12%

Causes of uneven and rapid tire wear
Front end alignment procedure
Toe-in adjustment
Tire wear diagnosis

Caster/Camber - 6%

How to adjust caster on a solid axle
Recognize extreme conditions from a picture

Basic Steering System Knowledge - 32%

Front suspension components
Steering gears
Wheel bearings
Steering Wheel freeplay
Steering knuckle wear
Installing kingpin bushings
Sector shaft adjustment
Power steering pump replacement

Basic Suspension Knowledge - 18%

Cap screw head markings
Suspension adjustment
Equalizing beam suspensions
Adjustable trailer axles

SAMPLE QUESTION:

A tractor trailer rig with tandems on both units rides and handles good when loaded. When unloaded, the rig wobbles. Which of the following is the most likely cause of this condition?

- A. Misaligned trailer tandems.
- B. Wrong caster settings.
- C. Misaligned tractor tandems.
- D. Wrong toe setting.

ANSWER: B

MECHANIC STUDY GUIDE

Electrical Systems

Heavy Duty Truck

Listed below are a number of items and subjects which make up the mechanic certification test identified above. An individual's ability to pass the certification test will depend upon the amount of knowledge the person has concerning these items.

System Diagnosis - 22%

Lamp circuits
High & low beam headlamp questions
Dash lights
Alternator circuits
Windshield wiper circuit
Oil pressure sending unit
Circuit diagnosis
Horn Circuits

General - 10%

Batteries
Fusible links
Hydrometer use
Jump starting
Fuse box replacement

Vehicle Lighting - 18%

Turn signal circuit
Tail lamp circuit
Head lamp circuit
Dash light circuit
Clearance lights

Starting Systems - 24%

Battery hook-ups
Starter circuit resistance
Specific gravity readings
Solenoid problems
Starter draw test
Starter drives
Starter no-load test

Charging Systems - 12%

Low or unsteady alternator output
Alternator Circuitry
Overcharged battery problem
Alternator amperage limit

Test Methods & Equipment - 14%

Voltmeter use
Ohmmeter use
Circuit testing
Verifying a circuit drain
Alternator rotor tests
Ammeter use

SAMPLE QUESTION:

The alternator output current is 0 amps. What could cause this condition?

- A. An open diode.
- B. A grounded rectifier bridge.
- C. An open rotor winding.
- D. All of the above

ANSWER: C

